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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/915,751	07/26/2001	Peter Geiger	5143-02501	7482

7590 01/08/2003
Jeffrey C. Hood
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EXAMINER

VERBRUGGE, KEVIN

ART UNIT	PAPER NUMBER
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2188

DATE MAILED: 01/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/915,751

Applicant(s)

GEIGER ET AL.

Examiner

Kevin Verbrugge

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 26 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☐ Claim(s) 1-134 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9, 17-22, 25-28, 33-45, 55-76, 78-89, 93-117 and 125-134 is/are rejected.
- 7) ☒ Claim(s) 10-16, 23, 24, 29-32, 46-54, 77, 90-92 and 118-124 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Specification

The disclosure is objected to because of the following informalities: on page 15, line 13, 09/239658 is the wrong serial number. Presumably it should be changed to 09/239659.

Appropriate correction is required.

Claim Objections

Claim 66 is objected to because of the following informalities: it depends on claim 17, a method claim. Presumably it should depend on claim 65.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The claims detailed below are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 5,699,539 to Garber et al., hereinafter simply Garber.

Regarding claims 1-4, 22, 33, 34, 38-42, 55-61, 93, 94, 98, 102, 129, and 131-134, Garber discloses a virtual memory management system and method using data compression.

In Fig. 2, he shows the claimed one or more processors as CPU 102.

He shows the claimed physical memory as primary memory 104.

The claimed system memory controller is inherent in his system since it is required to control primary memory 104.

He shows the claimed compressed memory management unit (CMMU) as virtual memory unit (VMU) 110.

Garber's VMU performs the claimed steps of receiving a system memory access including a system memory address, translating the system memory address into a first physical memory address, causing the decompression of compressed data at the first physical address, writing the decompressed data to a second physical address, and passing the second physical address to the system memory controller.

Furthermore, Garber's system fulfills the system memory access from the decompressed data at the second physical memory address and keeps least recently used data as compressed data in the physical memory and most recently and frequently used data as uncompressed data in the physical memory as claimed.

Regarding claims 36, 63, and 100, Garber's system includes program instructions for an operating system that is not aware of the increased effective size of the memory as claimed.

Regarding claims 73, 78, 79, and 125, Garber's device includes the claimed compression/decompression engine.

Regarding claim 67, Garber shows the claimed page translation table in Fig. 4 as his page table or page map.

Regarding claim 97, Garber teaches that his device monitors the actual compression ratio achieved at column 20, lines 40-49 and claim 4.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The claims detailed below are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,699,539 to Garber et al., hereinafter simply Garber.

Regarding claims 35, 37, 62, 64, 99, and 101, in Garber's device, the operating system is apparently unaware of the increased effective size of the memory. However, It would have been obvious to one of ordinary skill in the art at the time the invention

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was made to make the operating system aware of the increased effective size of part or all of the system memory to provide enhanced memory control to the operating system.

Regarding claims 5-9, 17-19, 25-28, 43-45, 65, 68-70, 74-76, 103, 126, and 127, Garber does not disclose a page translation cache, but It would have been obvious to one of ordinary skill in the art at the time the invention was made to include such a cache (also known as a translation lookaside buffer) since TLBs were well-known in the art at the time and improved operation speed by caching recently used page address translations.

Garber does not disclose the claimed scatter/gather DMA channels but his device operates equivalently by transferring and receiving data to and from the VMU as needed.

The steps of looking in the TLB for a translation, and if not found, of obtaining it from the page table and storing it in the TLB were well-known at the time of the invention and would obviously be implemented if a TLB were implemented.

Regarding claims 66 and 104, Garber's device includes the claimed compression/decompression engine.

Regarding claims 20, 21, 71, 72, and 105, TLBs were commonly fully-associative for design choice reasons, typically the flexibility in placing an entry in any slot and comparing all entries at once.

Regarding claims 80-89 and 106-117, the locations of the various elements are a matter of design choice, with certain advantages gained by placing certain elements in certain locations.

Regarding claim 95, Garber does not indicate that his page size is programmable, but he indicates that the page size is variable and is a matter of design choice and therefore It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the page size programmable.

Regarding claim 96, Garber does not indicate that his maximum compression ratio is programmable, but It would have been obvious to one of ordinary skill in the art at the time the invention was made to make it programmable to affect various degrees of compression.

Regarding claim 128, Garber's device maintains the claimed lists as shown in Fig. 13 for example.

Regarding claim 130, Garber does not teach that his threshold ratio is programmable, but It would have been obvious to one of ordinary skill in the art at the time the invention was made to make it programmable to achieve a specific ratio. In Garber's device, the ratio is roughly 3:1, compressed pages to uncompressed pages.

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Allowable Subject Matter

Claims 10-16, 23, 24, 29-32, 46-54, 77, 90-92, and 118-124 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The method claims are grouped and rejected with the apparatus claims because the steps of the method are met by the disclosure of the apparatus and methods of the reference(s) as discussed above.

Any inquiry concerning this or an earlier communication from the Examiner should be directed to Primary Examiner Kevin Verbrugge by phone at (703) 308-6663.

Any response to this action should be mailed to Commissioner for Patents, Washington, D.C. 20231 or faxed to

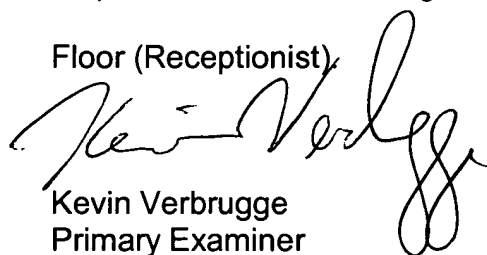
(703) 746-7238 After-final

(703) 746-7239 Official

(703) 746-7240 Non-Official/Draft

and labeled appropriately (After-final, Official, Non-Official/Draft). Hand-delivered responses should be brought to Crystal Park 2, 2121 Crystal Drive, Arlington, VA, 4th

Floor (Receptionist),



Kevin Verbrugge
Primary Examiner
1/2/03